made a thorough-going embryological study of the carpus and tarsus of the problematic mammal Hyrax. Since in the embryo the hind foot shows traces of the first and fifth digits, the extremities of Hyrax point to derivation from a primitive form with five digits. The embryonic carpus contains two centralia like the embryonic carpus of the turtle. Traces of both prepollex and prehallux were found. The carpus and tarsus of Hyrax must have been derived from a more primitive form than Phenacodus. Since they show as many affinities to the rodents as to the fossil ungulates, Hyrax has probably been derived from some form in which these two types were united, the Toxodontia, or possibly the more primitive Tillodontia.

The growth of micro-photography has been so rapid that the A B C of the subject has been issued in a handy volume by W. H. Walmsley (N. Y., Tennant & Ward, 1903. iv–155 pp., 13 pls.). Chapters are devoted to the microscope, the camera, illumination, negative making and printing. The experience of an expert, the high quality of whose work is attested by the illustrations that accompany the volume, is given freely to the beginner.

BOTANY.

Setchell and Gardner's N. W. Algæ.[1]— This is a careful and thorough account of the marine Algæ of the Pacific coast of America from Cape Flattery north to the Arctic Ocean, and of the fresh water species found near the shore through the same range, the Diatomaceæ and Desmidiaceæ excepted. The information hitherto accessible has been scattered through many books and papers in various languages, and this is now brought together, but covers only the smaller part of the present work, the rest being now presented by the authors for the first time. This is specially the case as to the fresh water Algæ, in regard to which very little indeed is on record previous to this work.

Every species mentioned by previous writers is included in this list, even if the authors consider the determination as unreliable, or that

[1] Setchell, W. A. and Gardner, N. L. Algæ of Northwestern America. Univ. Cal. Publications, Botany, Vol. 1, pp. 165–418; Pl. XVII–XXVII. Berkeley, March 31, 1903.

the plant in question is to be included under another name here; this makes the total number of species to be credited to the Flora somewhat uncertain; but leaving out about 50 forms, which may be considered as erroneously or uncertainly reported, the following species or named varieties and forms will approximately represent the extent of the Flora.

	Fresh water.	Marine.
Cyanophyceæ	99	26
Chlorophyceæ	65	76
Phaeophyceæ	1	147
Rhodophyceæ	9	214
Total	174	463

This is really a much richer list than any one had before supposed probable; the proportion of Cyanophyceæ is exceptionally large, comparing well with the same order in regions which have long been studied by resident botanists. Dr. Setchell is well known as a specialist on the Cyanophyceæ, and in the expedition along the coast of Alaska recognized many forms which would probably be overlooked by most collectors. The Laminariaceæ are also well represented, and to Dr. Setchell is due the clear presentation and arrangement of these perplexing plants.

It is interesting to compare the Flora of the northwest coast with that of the northeast coast of America. Comparatively few marine species are common, but the proportion increases as we go north, and the common species are mostly found also in northern Europe, indicating a common arctic origin for all the high northern floras, apart from this element there are a few cosmopolitan species, common to both sides of the continent. A few species are common to the Flora of eastern Asia, and a few are common to the European Flora but not found on the west side of the Atlantic; the remaining species, about half of the whole, in the case of the red Algæ more than half, are, as far as known, limited to the Pacific coast of the United States. As regards the fresh water Algae, the case is quite different; nearly all the species are cosmopolitan, some in all latitudes, some in temperate regions only; very few are limited to this region; it is interesting to note that most of the cosmopolitan marine species are of the Cyanophyceæ and Chlorophyceæ, orders more largely fresh water than marine. It is probably accidental that the four species of Characeæ, all European, are reported from Alaska only, in the extreme North.

In the introduction the authors divide the entire west coast into four quite well marked regions of algal growth; the Tropical, the North Subtropical, the North Temperate and the Boreal; with the suggestion that further study may make it necessary to divide the latter into an Upper and a Lower Boreal. The approximate boundaries are Magdalena Bay, Lower California; Point Conception, California, and Puget Sound. The present work includes such of the Temperate element as appears in Puget Sound, and the whole of the Boreal. The subtropical families Valoniaceæ and Dictyotaceæ are each represented by a single species. If the division of the Boreal into upper and lower is adopted, each of these regions corresponds to a range of surface temperature, there being a variation of 5° C. as we pass from one to another; each region having approximately a difference of 5° C. between the maximum and the minimum. The division between the upper and the lower Boreal has an isochryme of 5° C. and an isothere of 10° C. the southern limit of the North Temperate having 20° C. and 25° C. respectively.

As is to be expected from the latitude, the great Laminariaceæ are the most conspicuous element of the Flora; this region probably exceeds all others in the gigantic size of the individuals and the variety of forms of this family. The genus Alaria is represented by eighteen species and forms, one of which, *A. fistulosa*, has a blade reaching a length of 25 meters. The eighteen different genera of Laminariaceæ form a very rich representation of the family. Lithothamnion and the allied genera are well represented, comparing favorably with other northern regions; while the jointed Corallinaceæ have many forms, contrasting strongly with the single species found on our Northeast coast.

While many individual collectors at various points have contributed to this work, the greater part of the material on which it is founded was obtained by the expedition from the University of California, in the summer of 1899, on which Professor Setchell was accompanied by W. L. Jepson, L. E. Hunt and A. A. Lawson; while it is certain that additions will be made to the list by future explorers, the general character of the marine Flora may be considered as fairly well established.

The arrangement follows the system of Engler & Prantl in the main; as to nomenclature, a very conservative course has been followed, generic names long in use being retained, no effort having been made to replace them by earlier but neglected or abandoned

names; nor have specific names been changed unless the change was unavoidable. "We have preferred to devote our time to the study of the plant itself" the authors say, and certainly if the choice had to be made, they have chosen wisely. We have an ample supply of botanical literature, affixing the author's name to new binomials, representing plants that the author would never recognize if he met them. The authors of this work know their plants thoroughly, and those who enjoy juggling with names, can do it at their leisure.

In the matter of specific limitations, there is quite a tendency to broaden out a species, and give form names to what others would consider autonomous species; not less than 142 "formæ" being named in this work, some representing former species, some being newly distinguished. Laminaria, Alaria and Fucus give good examples of this practice; but perhaps the most striking are in Corallina and Amphiroa; here the disappearance of former species is quite startling. Two new genera, Whidbeyella and Collinsiella are proposed, and nine new species; the authors propose nothing as a variety, recognizing the term only as used by other authors. Descriptions of new species and forms are full and clear; there are eleven good plates; the type and paper are excellent. Specimens are referred to by collectors or exsiccatae members; there is a good index, and a very full list of the literature of the subject. Exact localities are given in almost every case, and there is an alphabetical list of all the localities mentioned, with full indication of the latitude, longitude, etc., of each; this novel feature is contributed by Professor George Davidson of the University of California.

No work of such general importance to this department of American botany has appeared since Harvey's *Nereis Boreali-Americana*, fifty years ago; and while undoubtedly much will be added by the subsequent studies of the active botanists who are doing such good work on the west coast, it is unlikely that there will ever be any one contribution that will contain as much new information as does this. The authors deserve the thanks of all students of Algæ.

FRANK S. COLLINS.

Notes.— The *Proceedings of the Society for the Promotion of Agricultural Science*, for the 24th meeting, contain the following articles of botanical interest: Jones and Sprague, "Plum Blight caused by the Pear Blight Organism"; Saunders, "Some Results of Cross Fertilizing," and "Decrease in Vitality of Grain by Age"; Fernow, "The Significance of the Farmer's Woodlot"; Pammel and Lum-